

### Strand 1: Number Sense and Operations

Every student should understand and use all concepts and skills from the previous grade levels. The standards are designed so that new learning builds on preceding skills and are needed to learn new skills. Communication, Problem-solving, Reasoning & Proof, Connections, and Representation are the process standards that are embedded throughout the teaching and learning of mathematical strands.

#### Concept 1: Number Sense

Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 1. Make a model to represent a given whole number 0 through 20.	PO 1. Make a model to represent a given whole number 0 through 100.	PO 1. Make a model to represent a given whole number 0 through 999.							
PO 2. Identify orally a whole number represented by a model with a word name and symbol 0 through 20. (Say 3 and write number 3 when presented with three objects.)	PO 2. Identify a whole number represented by a model with a word name and symbol 0 through 100.	PO 2. Identify a whole number represented by a model with a word name and symbol 0 through 999.	PO 1. Read whole numbers in contextual situations (through six-digit numbers).	PO 1. Read whole numbers in contextual situations.					
PO 3. Count aloud, forward to 20 or backward from 10, in consecutive order (0 through 20).	PO 3. Count aloud, forward or backward, in consecutive order (0 through 100).	PO 3. Count aloud, forward or backward, in consecutive order (0 through 999).							

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PO 4. Identify whole numbers through 20 in or out of order.	PO 4. Identify whole numbers through 100 in or out of order.	PO 4. Identify whole numbers through 999 in or out of order.	PO 2. Identify six-digit whole numbers in or out of order.	PO 2. Identify whole numbers in or out of order.					
PO 5. Write whole numbers through 20 in or out of order.	PO 5. Write whole numbers through 100 in or out of order.	PO 5. Write whole numbers through 999 in or out of order.	PO 3. Write whole numbers through six-digits in or out of order.	PO 3. Write whole numbers in or out of order.					
PO 6. Construct equivalent forms of whole numbers, using manipulatives, through 10. (e.g., $??+??=???+?$ )	PO 6. Construct equivalent forms of whole numbers, using manipulatives or symbols, through 99. (e.g., $15 + 5 = 10 + 10$ )	PO 6. State equivalent forms of whole numbers using multiples of 10 through 1,000. ( $430 + 200 = 600 + 30$ )							

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	PO 7. State verbally whole numbers, through 100, using correct place value. (e.g., a student will read 84 as eight tens and four ones)	PO 7. State verbally whole numbers, through 999, using correct place value. (e.g., a student will read <u>528</u> as five hundreds, two tens and eight ones)	PO 4. State whole numbers, through six-digits, with correct place value, by using models, illustrations, symbols, or expanded notation. (e.g., $53,941 = 50,000 + 3,000 + 900 + 40 + 1$ )	PO 4. State place values for whole numbers. (e.g., In the number 203,495 what is the value of the 2?)					
	PO 8. Construct models to represent place value concepts for the one's and ten's places.	PO 8. Construct models to represent place value concepts for the one's, ten's, and hundred's places.	PO 5. Construct models to represent place value concepts for the one's, ten's, and hundred's places.	PO 5. Construct models to represent place value concepts for the one's, ten's, hundred's, and thousand's places.					

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	PO 9. Apply expanded notation to model place value through 99. (e.g., $37 = 3$ groups of ten + 7 units)	PO 9. Apply expanded notation to model place value through 999. (e.g., $378 = 3$ hundreds + 7 tens + 8 ones)	PO 6. Apply expanded notation to model place value through 9,999. (e.g., $5,378 = 5,000 + 300 + 70 + 8$ )	PO 6. Apply expanded notation to model place value. (e.g., $203,495 = 200,000 + 3,000 + 400 + 90 + 5$ )					
	PO 10. Identify odd and even whole numbers through 100.	PO 10. Identify odd and even (including 0) whole numbers through 999.	PO 7. Sort whole numbers into sets containing only odd numbers or only even numbers.						
PO 7. Compare two whole numbers through 20.	PO 11. Compare two whole numbers through 100.	PO 11. Compare two whole numbers through 999.	PO 8. Compare two whole numbers, through six-digits.	PO 7. Compare two whole numbers.					
PO 8. Recognize the ordinal numbers through fifth. (i.e., first, second, third, etc.)	PO 12. Use ordinal number through tenth.	PO 12. Use ordinal numbers.							

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PO 9. Order three or more whole numbers through 20 (least to greatest or greatest to least).	PO 13. Order three or more whole numbers through 100 (least to greatest or greatest to least).	PO 13. Order three or more whole numbers through 999 (least to greatest or greatest to least).	PO 9. Order three or more whole numbers through six-digit numbers (least to greatest, or greatest to least).	PO 8. Order three or more whole numbers.					
	PO 14. Make models that represent given fractions. (Halves)	PO 14. Make models that represent given fractions (halves and fourths).	PO 10. Make models that represent proper fractions (halves, thirds, fourths, eighths and tenths).	PO 9. Make models that represent mixed numbers.	PO 1. Make models that represent improper fractions.				

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	PO 15. Identify in symbols and in words a model that is divided into equal fractional parts. (Halves)	PO 15. Identify in symbols and words a model that is divided into equal fractional parts. (Halves and fourths)	PO 11. Identify symbols, words, or models that represent proper fractions. (Halves, thirds, fourths, eighths and tenths)	PO 10. Identify symbols, words, or models that represent mixed numbers.	PO 2. Identify symbols, words, or models that represent improper fractions.	PO 1. Express fractions as ratios, comparing two whole numbers. (e.g., $\frac{3}{4}$ is equivalent to 3:4 and 3 to 4)			
			PO 12. Use proper fractions in contextual situations.	PO 11. Use mixed numbers in contextual situations.	PO 3. Use improper fractions in contextual situations.				
			PO 13. Compare two proper fractions with like denominators.	PO 12. Compare two unit fractions (e.g., $\frac{1}{2}$ to $\frac{1}{5}$ ) or proper or mixed numbers with like denominators.	PO 4. Compare two proper fractions or improper fractions with like denominators.	PO 2. Compare two proper fractions, improper fractions or mixed numbers.			

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			PO 14. Order three or more proper fractions with like denominators (Halves, thirds, fourths, eighths and tenths).	PO 13. Order three or more unit fractions or proper or improper fractions with like denominators.	PO 5. Order three or more unit fractions, proper or improper fractions with like denominators or mixed numbers with like denominators.	PO 3. Order three or more proper fractions, improper fractions or mixed numbers.			
PO 10. Identify penny, nickel, dime, quarter, and dollar by using manipulatives or pictures.	PO 16. Identify money by name and value: penny, nickel, dime, quarter, and one-dollar.	PO 16. Count money through \$5.00 using manipulatives and pictures of bills and coins.	PO 15. Count amounts of money through \$20.00 using pictures or actual bills and coins.						
	PO 17. Count money through \$1.00 using coins.								

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	PO 18. Identify the value of a collection of coins using the symbols ¢ and \$.	PO 17. Identify the value of a collection of money using the symbols ¢ and \$ through \$5.00.							
		PO 18. Use decimals through hundredths in contextual situations with money.	PO 16. Use decimals through hundredths in contextual situations.	PO 14. Use decimals in contextual situations.					
		PO 19. Compare two decimals using money, through hundredths, using models, illustrations, or symbols.	PO 17. Compare two decimals, through hundredths, using models, illustrations, or symbols.	PO 15. Compare two decimals.	PO 6. Compare two whole numbers, fractions, and decimals. (e.g., $\frac{1}{2}$ to 0.6)				



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			PO 18. Order three or more decimals, through hundredths, using models, illustrations, or symbols.	PO 16. Order three or more decimals.	PO 7. Order whole numbers, fractions, and decimals.				
		PO 20. Distinguish the equivalency among decimals, fractions and percents. (e.g., Half-dollar = 50¢ = 50%)	PO 19. Determine the equivalency among decimals, fractions, and percents. (e.g., Half-dollar = 50¢ = 50% and $1/4 = 0.25 = 25\%$ )	PO 17. Determine the equivalency among decimals, fractions, and percents. (e.g., $49/100 = 0.49 = 49\%$ )	PO 8. Determine the equivalency between and among fractions, decimals, and percents in contextual situations.	PO 4. Determine the equivalency between and among fractions, decimals, and percents in contextual situations.	PO 1. Express fractions as terminating or repeating decimals.		
			PO 20. Identify whole-number factors and/or pairs of factors for a given whole number through 24.	PO 18. Identify all whole-number factors and pairs of factors for a given whole number through 144.	PO 9. Identify all whole number factors and pairs of factors for a number.	PO 5. Identify the greatest common factor for two whole numbers.	PO 2. Identify the greatest common factor for a set of whole numbers.		

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			PO 21. Determine multiples of a given whole number with products through 24 (skip counting).	PO 19. Determine multiples of a given whole number with products through 144.	PO 10. Recognize that 1 is neither a prime nor a composite number.	PO 6. Determine the least common multiple for two whole numbers.	PO 3. Determine the least common multiple for a set of whole numbers.		
					PO 11. Sort whole numbers (through 50) into sets containing only prime numbers or only composite numbers.	PO 7. Express a whole number as a product of its prime factors using exponents when appropriate.			
							PO 4. Choose the appropriate signed real number to represent a contextual situation.		

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							PO5. Recognize the absolute value of a number used in contextual situations.		
							PO 6. Locate integers on a number line.	PO 1. Locate rational numbers on a number line.	
							PO 7. Order integers.	PO 2. Identify irrational numbers.	PO 1. Classify real numbers as members of one or more subsets: natural, whole, integers, rational, or irrational numbers.

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							PO 8. Classify rational numbers as natural, whole, or integers.	PO 3. Classify real numbers as rational or irrational.	PO 2. Identify properties of the real number system: commutative, associative, distributive, identity, inverse, and closure.
									PO 3. Distinguish between finite and infinite sets of numbers.

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### Concept 2: Numerical Operations

Understand and apply numerical operations and their relationship to one another.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 1. Model addition through sums of 10 using manipulatives.	PO 1. Demonstrate the process of addition through sums of 20 using manipulatives.	PO 1. Demonstrate the process of addition through two three-digit whole numbers, using manipulatives.							
PO 2. Model subtraction with minuends of 10 using manipulatives.	PO 2. Demonstrate the process of subtraction with minuends of 20 using manipulatives.	PO 2. Demonstrate the process of subtraction using manipulatives with two-digit whole numbers.	PO 1. Demonstrate the process of subtraction using manipulatives through three-digit whole numbers.						
	PO 3. State addition facts for sums through 18 and subtraction for differences with minuends through 9 or less.	PO 3. State addition and subtraction facts.							

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#### Concept 2: Numerical Operations

Understand and apply numerical operations and their relationship to one another.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
	PO 4. Add one- and two-digit whole numbers without regrouping.	PO 4. Add one- and two-digit whole numbers with regrouping.	PO 2. Add two three-digit whole numbers.	PO 1. Add whole numbers.			PO 1. Add integers.		
	PO 5. Subtract one- and two-digit whole numbers without regrouping.	PO 5. Subtract one- and two-digit whole numbers with regrouping.	PO 3. Subtract two three-digit whole numbers.	PO 2. Subtract whole numbers.			PO 2. Subtract integers.		
		PO 6. Add 3 one- or two-digit addends.	PO 4. Add a column of numbers.						
PO 3. Select the operation to solve word problems using numbers 0 through 9.	PO 6. Select the grade level appropriate operation to solve word problems.	PO 7. Select the grade level appropriate operation to solve word problems.	PO 5. Select the grade level appropriate operation to solve word problems.	PO 3. Select the grade level appropriate operation to solve word problems.	PO 1. Select the grade level appropriate operation to solve word problems.	PO 1. Select the grade level appropriate operation to solve word problems.	PO 3. Select the grade level appropriate operation to solve word problems.	PO 1. Select the grade level appropriate operation to solve word problems.	PO 1. Select the grade level appropriate operation to solve word problems.

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PO 4. Solve word problems presented orally using addition or subtraction with numbers through 9.	PO 7. Solve word problems using addition and subtraction of 2-digit numbers without regrouping.	PO 8. Solve word problems using addition and subtraction of two 2-digit numbers, with regrouping AND two 3-digit numbers without regrouping.	PO 6. Solve word problems using grade level appropriate operations and numbers.	PO 4. Solve word problems using grade level appropriate operations and numbers.	PO 2. Solve word problems using grade level appropriate operations and numbers.	PO 2. Solve word problems using grade level appropriate operations and numbers.	PO 4. Solve word problems using grade level appropriate operations and numbers.	PO 2. Solve word problems using grade level appropriate operations and numbers.	PO 2. Solve word problems using grade level appropriate operations and numbers.
	PO 8. Count by multiples to show the process of multiplication (10s, 5s, or 2s).	PO 9. Count by multiples of three.	PO 7. Demonstrate the process of multiplication as repeatedly adding the same number, counting by multiples, combining equal sets, and making arrays.	PO 5. Multiply multi-digit numbers by two-digit numbers.	PO 3. Multiply whole numbers.		PO 5. Multiply integers.	PO 3. Determine the square of an integer.	

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			PO 8. Demonstrate the process of division with one-digit divisors (Separating elements of a set into smaller equal sets, sharing equally, or repeatedly subtracting the same number).	PO 6. Divide with one- digit divisors.	PO 4. Divide with whole numbers.		PO 6. Divide integers.	PO 4. Determine the square root of an integer.	
	PO 9. Demonstrate families of equations for addition and subtraction through 18.		PO 9. Demonstrate families of equations for multiplication and division through 9s.						
		PO 10. State multiplication facts: 2s, 5s and 10s.	PO 10. State multiplication and division facts through 9s.	PO 7. State multiplication and division facts through 12s.					



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	PO 10. Demonstrate the identity and commutative properties of addition through 18.	PO 11. Demonstrate the associative property of addition. (e.g., $(3 + 5) + 4 = 3 + (5 + 4)$ )	PO 11. Demonstrate the commutative and identity properties of multiplication.	PO 8. Demonstrate the associative property of multiplication.	PO 5. Demonstrate the distributive property of multiplication over addition.				
	PO 11. Identify addition and subtraction as inverse operations.		PO 12. Identify multiplication and division as inverse operations.		PO 6. Demonstrate the addition and multiplication properties of equality.			PO 5. Identify squaring and finding square roots as inverse operations.	
		PO 12. Apply grade level appropriate properties to assist in computation.	PO 13. Apply grade level appropriate properties to assist in computation.	PO 9. Apply grade level appropriate properties to assist in computation.	PO 7. Apply grade level appropriate properties to assist in computation.	PO 3. Apply grade level appropriate properties to assist in computation.	PO 7. Apply grade level appropriate properties to assist in computation.	PO 6. Apply grade level appropriate properties to assist in computation.	PO 3. Simplify numerical expressions including signed numbers and absolute values.

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PO 5. Identify the symbols: +, -, =.	PO 12. Apply the symbols: +, -, =.	PO 13. Apply the symbols: +, -, ×, ÷, =, ≠, <, >, %.	PO 14. Apply the symbols: ×, ÷, /, *, %, and the grouping symbols ( ) and “,”.	PO 10. Apply the symbol: • and ( ) for multiplication, and ≡, ≡.	PO 8. Apply the symbol “[ ]” to represent grouping.	PO 4. Apply the symbols for “...” or “???” to represent repeating decimals and “:” to represent ratios, superscripts as exponents.	PO 8. Apply the symbols + and – to represent positive and negative, and “    ” to represent absolute value.	PO 7. Apply the symbols “√” to represent square root, “±” to represent roots, “{ }” as grouping symbols.	PO 4. Apply subscripts to represent ordinal position.
PO 6. Use grade level appropriate mathematical terminology.	PO 13. Use grade level appropriate mathematical terminology.	PO 14. Use grade level appropriate mathematical terminology.	PO 15. Use grade level appropriate mathematical terminology.	PO 11. Use grade level appropriate mathematical terminology.	PO 9. Use grade level appropriate mathematical terminology.	PO 5. Use grade level appropriate mathematical terminology.	PO 9. Use grade level appropriate mathematical terminology.	PO 8. Use grade level appropriate mathematical terminology.	PO 5. Use grade level appropriate mathematical terminology.
					PO 10. Simplify fractions to lowest terms.	PO 6. Simplify fractions to lowest terms.			
	PO 14. Demonstrate addition of fractions with like denominators (halves) using models.	PO 15. Demonstrate addition of fractions with like denominators (halves and fourths) using models.							

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	PO 15. Demonstrate subtraction of fractions with like denominators (halves) using models.	PO 16. Demonstrate subtraction of fractions with like denominators (halves and fourths) using models.	PO 16. Add or subtract fractions with like denominators (halves, thirds, fourths, eighths, and tenths) appropriate to grade level.	PO 12. Add or subtract fractions with like denominators, no regrouping.	PO 11. Add or subtract proper fractions and mixed numbers with like denominators with regrouping.				
						PO 7. Add or subtract proper fractions and mixed numbers with unlike denominators with regrouping.			
						PO 8. Demonstrate the process of multiplication of proper fractions using models.			

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						PO 9. Multiply proper fractions.			
						PO 10. Multiply mixed numbers.			
						PO 11. Demonstrate that division is the inverse of multiplication of proper fractions.			
						PO 12. Divide proper fractions.			
						PO 13. Divide mixed numbers.			

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	PO 16. Add and subtract money without regrouping using manipulatives and paper and pencil, through 99¢.	PO 17. Add and subtract money without regrouping using manipulatives and paper and pencil, through \$5.00.	PO 17. Apply addition and subtraction in contextual situations, through \$20.00.		PO 12. Add or subtract decimals.				
					PO 13. Multiply decimals.				
					PO 14. Divide decimals.	PO 14. Solve problems involving fractions or decimals (including money) in contextual situations.	PO10. Calculate the percent of a given number.	PO 9. Calculate the missing value in a percentage problem.	

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							PO 11. Convert numbers expressed in standard notation to scientific notation and vice versa. (positive exponents only)	PO 10. Convert standard notation to scientific notation and vice versa.	PO 6. Compute using scientific notation.
				PO 13. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	PO 15. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	PO 15. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	PO 12. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	PO 11. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	PO 7. Simplify numerical expressions using the order of operations.

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<b>Concept 3: Estimation</b> Use estimation strategies reasonably and fluently.									
Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 1. Solve problems using a variety of mental computations and reasonable estimations.	PO 1. Solve problems using a variety of mental computations and reasonable estimation.	PO 1. Solve problems using a variety of mental computations and reasonable estimation.	PO 1. Solve grade level appropriate problems using estimation.	PO 1. Solve grade level appropriate problems using estimation.	PO 1. Solve grade level appropriate problems using estimation.	PO 1. Solve grade level appropriate problems using estimation.	PO 1. Solve grade level appropriate problems using estimation.	PO 1. Solve grade level appropriate problems using estimation.	PO 1. Solve grade level appropriate problems using estimation.
				PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is $3284 \times 343 = 1200$ reasonable?)	PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is $4.1 \times 2.7$ about 12?)	PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is $5/9 \times 3/7$ more than 1?)	PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is $-2.5 \times 18$ about $-50$ ?)	PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is 32 the square root of 64?)	PO 2. Determine if a solution to a problem is reasonable.
	PO 2. Estimate the measurement of an object using U.S. customary standard and non-standard units of measurement.	PO 2. Estimate the measurement of an object using U.S. customary standard and non-standard units of measurement.	PO 2. Estimate length and weight using U.S. customary units.	PO 3. Estimate length and weight using both U.S. customary and metric units.	PO 3. Round to estimate quantities.	PO 3. Round to estimate quantities in contextual situations. (e.g., round up or round down)	PO 3. Determine whether an estimation of an area is approximately equal to the actual measure.	PO 3. Express answers to the appropriate place or degree of precision. (e.g., time and money)	PO 3. Determine rational approximations of irrational numbers.

### Strand 1: Number Sense and Operations

Every student should understand and use all concepts and skills from the previous grade levels. The standards are designed so that new learning builds on preceding skills and are needed to learn new skills. Communication, Problem-solving, Reasoning & Proof, Connections, and Representation are the process standards that are embedded throughout the teaching and learning of mathematical strands.

#### Concept 3: Estimation

Use estimation strategies reasonably and fluently.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
			PO 3. Record estimated and actual linear measurements for real life objects (e.g. length of fingernail; height of desk).	PO 4. Estimate and measure for distance.	PO 4. Estimate and measure for area and perimeter.	PO 4. Estimate and measure for the area and perimeter of polygons using a grid.	PO 4. Determine whether an estimation of an angle is approximately equal to the actual measure.		
		PO 3. Compare an estimate to the actual measure.	PO 4. Compare estimations of appropriate measures to the actual measures.		PO 5. Compare estimated measurements between U.S. customary and metric systems. (e.g. a yard is about a meter)		PO 5. Determine whether an estimation of the circumference of a circle is approximately equal to the actual measure.		
		PO 4. Evaluate the reasonableness of an estimate.	PO 5. Evaluate the reasonableness of estimated measures.			PO 5. Verify the reasonableness of estimates made from calculator results within a contextual situation.	PO 6. Verify the reasonableness of estimates made from calculator results within a contextual situation.	PO 4. Verify the reasonableness of estimates made from calculator results within a contextual situation.	